Progress Report: Task B-2 Venus 1:1.5M Topographic Maps

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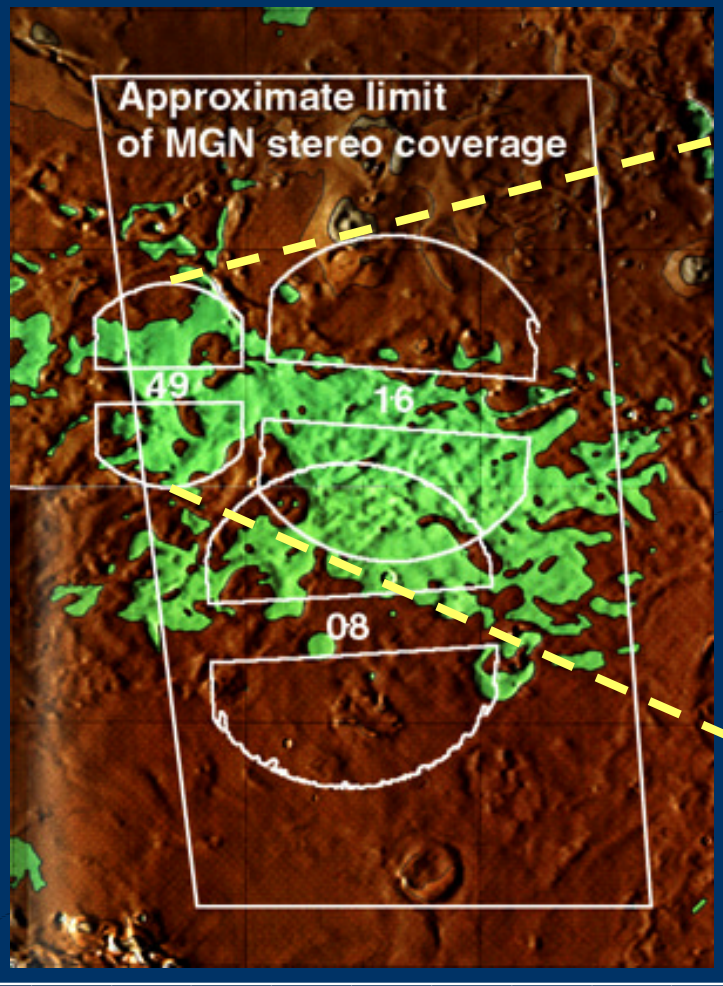
Background

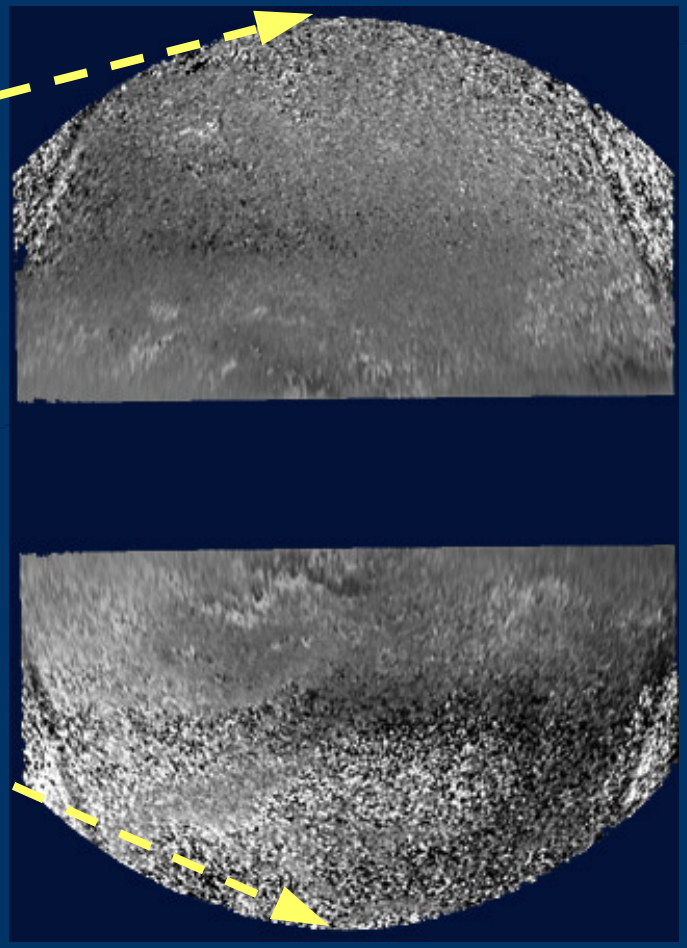
- FY 2001 proposal: Operational mapping
  - $125K
  - 5 FMAP quads (12°x12°)
- PCGMWG expressed concerns about sensitivity of DTMs to noisy/erroneous altimetry data
  - ✂ Budget cut to $40K
  - U/G/ instructed to focus on tests ("transects") in *small areas* to be identified by WG
  - Use other altimetry in setup and/or as a check
    - Campbell's MGN with echo quality analysis
    - Goldstone Earth-based altimetry

Selection of Test Areas

- PGCGMWG test area desires received Jan. 2001
  - Area of Goldstone/Magellan-stereo overlap
  - Central Ovda regio
- Total area equivalent to the original 5 quads!
  - *Must reduce the number and/or size of areas*
- Goldstone data effectively useless for testing because of noise level (~1 km RMS)
- Focus on Ovda

Goldstone/MGN Stereo Overlap





Better Mapping Through Chemistry

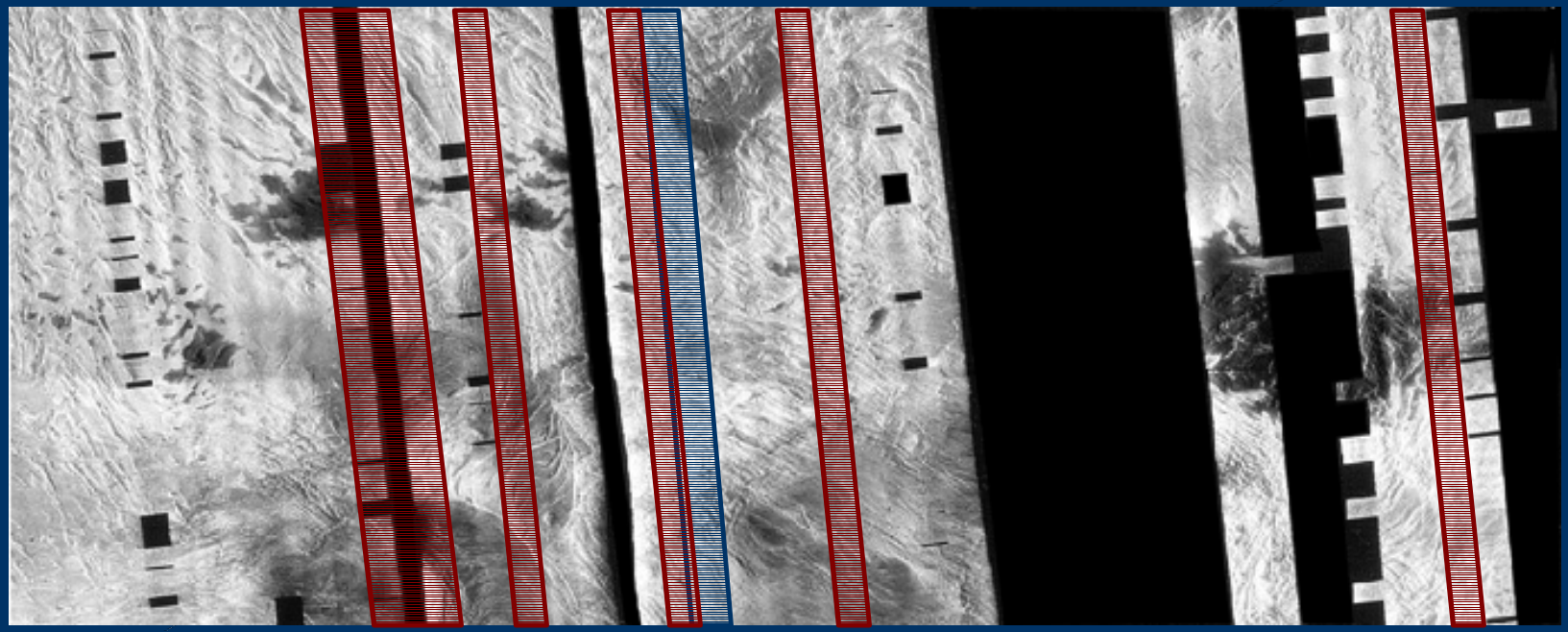
- Campbell does not believe echo-quality data can be used objectively/automatically in bundle adjustment
- Focus on high-altitude dark materials (Arvidson et al., 1994; Campbell et al. 1999) as test of resonableness of DTM results: Does the dark/bright boundary follow a contour?
- Dark patches straddle boundaries of FMAPs and of area suggested by PCGMWG (Murphy's Law of Cartography)

Central Ovda Test Mapping Area

- Selected "custom" area of reasonable size containing several high altitude dark patches
- Longitudes 88°–98°E, Latitudes 8°–5°S
- 47 Cycle 1 orbits 0947 to 0994
- 34 Cycle 3 orbits 4536 to 4582
  - Cycle 3 coverage has significant gaps
  - Where possible, extend control point collection north and south to bridge missing-orbit gaps
  - In largest Cycle 3 gap, connect Cycle 1 BIDRs only

Central Ovda Test Mapping Area

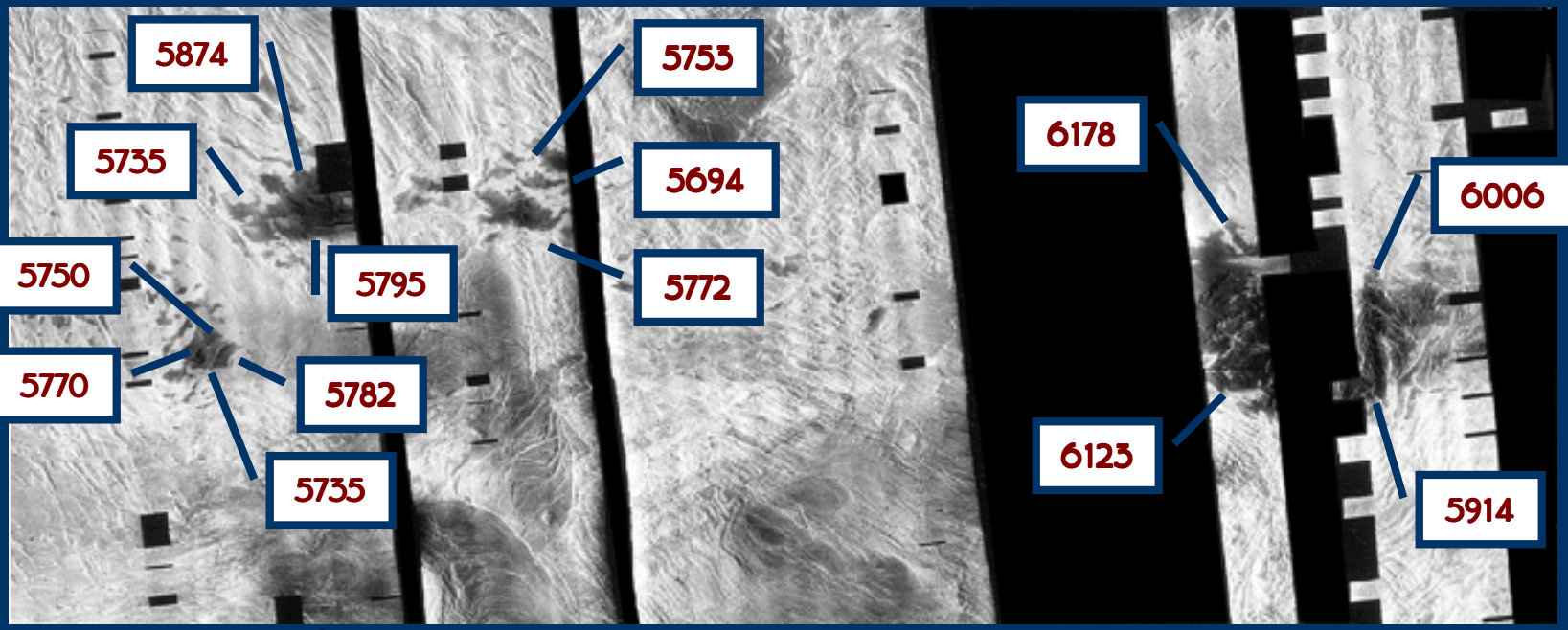
- Cycle 3 stereo-DLAP Coverage 88°–98°E, 8°–5°S



Progress

- 81 F-BIDRs ingested
- 212 tiepoints collected
- Bundle-adjustment carried out successfully
  - **Reminder:** Orbits are adjusted rigidly in 3 axes. This means ties with inconsistent altimetry data will be rejected; images/stereomodels do not "bend" to accommodate them.
- DTMs collected at 675 m/post—see poster
- Dark region boundary elevations
  - Locally constant to <100m for many km
  - Patches vary by 100s of m—texture vs. reflectivity?
  - Range of ~450 m across test area

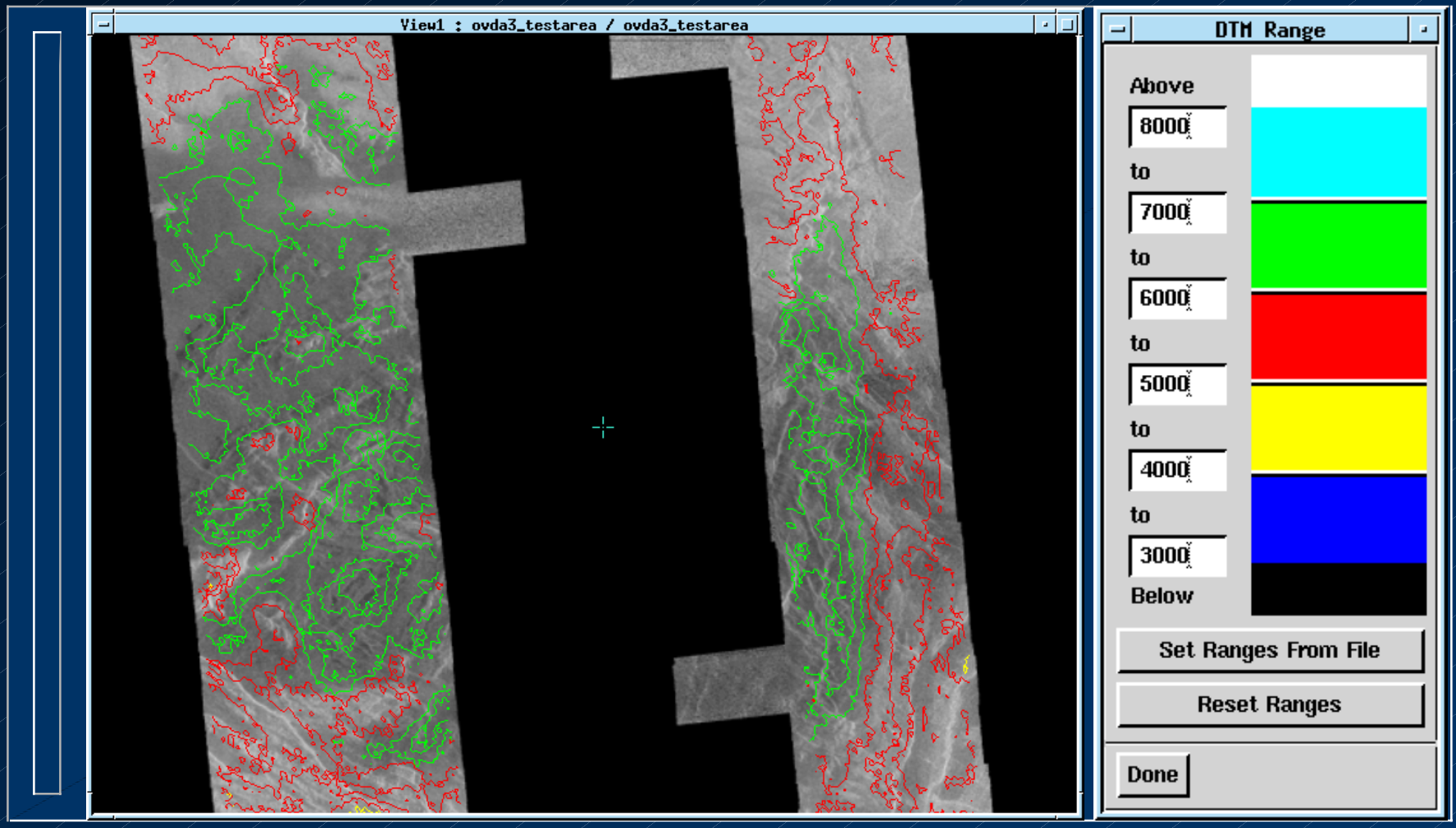
Dark Margin Spot Elevations



σ Between sites = 172 m

σ Within sites = 44 m

Closeup of Contours



Remaining Action Items

- Transmit DTM data with PCGMWG for review/assessment
  - Independent assessment of dark boundary heights
  - Comparison with altimetry
  - Comparison with altimeter echo quality…
- *We would love to have WG members come examine the data interactively on the DPW in Flagstaff*
- Prepare written (open-file?) report
- Prepare proposal to resume systematic mapping in FY 2002

Meanwhile...

- We reported last year on a mysterious bug in the MGN sensor model software
  - Errors of 10s of pixels in calculating N–S coordinate
  - Slightly variable from orbit to orbit
- Cause of about 90% of the problem identified:
  - Use of inexact λ in sensor model calculations
  - Fix eliminates cursor jumping, matching problems
- Cause of remaining high-latitude errors has been traced to difference between MGN USP and sensor model atmospheric refraction calculations
  - Currently checking which is correct